PACIFIC groundwater GROUP

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Yakima Co. Solid Waste

August 23, 2010

JE0704

Yakima County Department of Public Works
Solid Waste Division
7151 Roza Hill Drive
Yakima, WA 98901

Attn: Wendy Mifflin

Re: Second Quarter 2010 Landfill Gas Sampling

Dear Ms. Mifflin:

This letter reports landfill gas data collected at Terrace Heights Landfill (June 17, 22 and 23, 2010), Cheyne Landfill (March 23, 2010) and the Lower Valley Transfer Station (LVTS) (March 24, 2010).

SUMMARY

- *Methane concentrations exceeded 5% by volume (the lower explosive limit) at Terrace Heights Landfill in gas probe GP-4D (11.6 %). Yakima County Solid Waste is moving forward to address intermittent exceedances at GP-4.*
- *Methane concentrations exceeded 5% by volume on site at Cheyne Landfill in probes GP-2D (9.0 %) and GP-3D (20.8 %). These probes are not on the property boundary.*
- *Methane concentrations did not exceed 5% by (the lower explosive limit) at the Lower Valley Transfer Station in the perimeter gas probes, but did exceed 5% in passive gas collection wells GW-2 (10.2 %),GW-3 (18.0 %), GW-4 (28.6 %),GW-5 (18.9 %), GW-7 (41.2 %), GW-8 (42.5 %), GW-9 (35.4 %), and GW-10 (50.2%).*

LANDFILL GAS RESULTS

All gas probes sampled by PGG were purged with a portable hand pump immediately prior to sampling. Purge volume was a minimum of three times the casing volume where casing volume had been calculated, and 5L and 10L for shallow and deep probes respectively where purge volumes had not been calculated.

TERRACE HEIGHTS LANDFILL

Landfill gas monitoring at Terrace Heights includes 16 probes in eight separate monuments (Figure 1, Table 1). Each probe was sampled for methane using a Landtec GEM gas meter. Landfill gas was sampled on June 17, 22 and 23, 2010. Methane concentrations were non-detect in all probes along the southern edge of the landfill (Figures 2 and 3). Methane was detected at the northern portion of the landfill below the LEL at GP-4S (0.1 %) and GP-4M (0.6 %), and above the LEL at, and GP-4D (11.6 %).

Figure 2 shows the methane concentrations in all probes installed prior to 2003 in which methane has been detected. The spike in the June, 2000 sampling event may or may not be real. Regardless of the spike, methane has been present above LEL at the landfill from 1995 through August, 2005. The overall trend in measurements from monitoring probes along the southern boundary of Terrace Heights Landfill since March, 2005 is decreasing methane concentration to below the LEL. Detections at all probes along the southern boundary have been below the LEL in every sampling event since December, 2005.

Twelve gas extraction wells at six separate locations were installed at Terrace Heights in October, 2003 (Figure 1). Gas extraction commenced on April 6, 2005. Measurements taken immediately after the gas extraction system was started showed consistently high levels of methane at all well heads. Decreases in methane concentration in gas probes along the southern property line are consistent with removal of methane from the landfill via the gas extraction system. The continued decline in methane concentrations from April, 2005 through December, 2006 and levels below the LEL from December, 2006 through June, 2008 indicate that the gas extraction system has been effective at reducing subsurface methane levels along the southern property boundary.

Concentrations at GP-4D have varied above and below the LEL several times since 1996, and are currently above the LEL. The pattern of detections at GP-4 probes indicates that the landfill gas extraction system along the southern portion of the landfill is not significantly influencing methane concentrations in the northern portion of the landfill. On May 21, 2009, Yakima County Solid Waste notified Ted Silvestri at Yakima County Health Department of the intermittent exceedances at GP-4, and is actively pursuing landfill gas control options.

CHEYNE LANDFILL

Monitoring at Cheyne Landfill includes 16 probes in 8 separate monuments (Figure 4). Three additional probes were added in July 2007, shown on Figure 4 as GP-6, GP-7, and GP-8. GP-6-1[1], GP-6-2, GP-7-1, GP-7-2 are not included in the current monitoring program but are measured annually and have not had any detections of methane to date. Gas probes GP-8-1 and GP-8-2 will continue to be monitored on a quarterly basis because methane has been detected in these probes. Table 2 lists concentrations of

[1] These gas probes use a different naming system where GP-6-1 and GP-6-2 indicate the shallow and middle screened intervals, respectively. The -1 and -2 suffixes refer to the port numbers on the top of the Solinst CMT casing.

methane, oxygen, and carbon dioxide measured on June 3 and 11, 2010. Methane was detected above the LEL in probes GP-2D (9.0 %) and GP-3D (20.8 %). Methane was detected below the LEL at GP-1S (0.1 %), GP-1D (0.5 %), GP-3S (2.8 %), GP-8-1 (0.8 %), and GP-8-2 (0.5 %).

The plot of methane concentrations at Cheyne (Figure 5) suggests that levels above the LEL have been present in the landfill since the late 1990s. A large methane spike was detected in the June 2000 sampling event, as was the case at Terrace Heights. Again, the accuracy of the spike is difficult to assess. Regardless of the spike, the methane concentrations in GP-3D and GP-3S appear to have risen above and fallen below the LEL several times since 2002. The temporal pattern of concentrations at GP-3S is similar to GP-3D, but at lower concentrations. Methane at GP-2D has been consistently above the LEL since September 2005.

LOWER VALLEY TRANSFER STATION

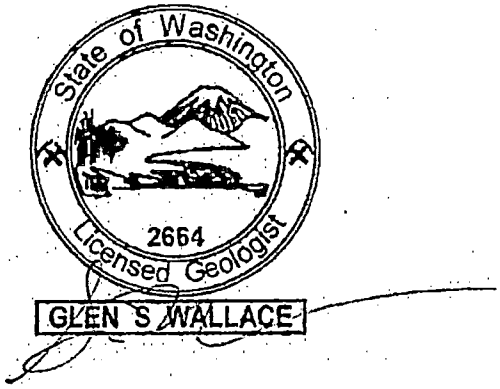
Six gas probes (in three separate monuments), 10 wells in the passive gas collection system, and a flare are sampled quarterly at the Lower Valley Transfer Station (LVTS) (Figure 6, Table 3). Measurements were collected on June 2, 2010. Methane was not detected above 0.1% in any of the perimeter gas probes. Methane concentrations exceeded 5% by volume in the gas extraction system at passive collection wells GW-2 (10.2 %), GW-3 (18.0 %), GW-4 (28.6 %), GW-5 (18.9 %), GW-7 (41.2 %), GW-8 (42.5 %), GW-9 (35.4 %), GW-10 (50.2 %). Methane was detected below the LEL at passive collection wells GW-1 (1.4 %) and GW-6 (1.1 %), and at the flare sampling port (0.5 %). The flare was not burning at the time of sampling. The flare igniter was clearly audible and a spark was observed at the ignition point.

CONTINUED SAMPLING

All of the probes at Terrace Heights, Cheyne and LVTS, as well as the passive collection and the flare at LVTS will be sampled again in September, 2010.

We trust this information meets your needs. Please feel free to call if you have questions.

Respectfully Submitted,
Pacific Groundwater Group



Glen Wallace, Ph.D.
Geologist

Attachments:

Table 1	Landfill Gas Monitoring Data, Terrace Heights
Table 2	Landfill Gas Monitoring Data, Cheyne
Table 3	Landfill Gas Monitoring Data, LVTS
Figure 1	Terrace Heights Landfill Site Map
Figure 2	Methane Concentrations at Terrace Heights
Figure 3	Methane Concentrations at Terrace Heights, Recently Installed Gas Probes
Figure 4	Cheyne Road Landfill Detailed Site Plan
Figure 5	Methane Concentrations at Cheyne
Figure 6	Lower Valley Transfer Station Site Map

Table 1. Landfill Gas Monitoring Data, Terrace Heights Landfill

2010 Q2

Probe	Date	Time	CH4 (% total)	CO2 (% total)	O2 (% total)
GP-1S	6/23/2010	11:11:00 AM	0	0.5	18.7
GP-2S	6/23/2010	11:03:00 AM	0	3.4	17.6
GP-2D	6/23/2010	11:03:00 AM	0	0.3	19.8
GP-3S	6/22/2010	4:13:00 PM	0	0.2	19.8
GP-3M	6/22/2010	4:14:00 PM	0	1.1	19.6
GP-3D	6/22/2010	4:15:00 PM	0	2.9	18.6
GP-4S	6/22/2010	1:25:00 PM	0.1	2.1	15.5
GP-4M	6/22/2010	1:23:00 PM	0.6	5.2	12.4
GP-4D	6/22/2010	1:20:00 PM	**11.6**	15	0.7
GP-5M	6/22/2010	3:52:00 PM	0	1.3	19.3
GP-5D	6/22/2010	3:54:00 PM	0	1.3	19.4
GP-6M	6/17/2010	3:57:00 PM	0	1	19.1
GP-6D	6/17/2010	3:59:00 PM	0	0.5	19
GP-7S	6/17/2010	3:56:00 PM	0	1.2	19.2
GP-8M	6/23/2010	11:17:00 AM	0	1	16.4
GP-8D	6/23/2010	11:15:00 AM	0	0.7	17.4

Bold indicates value above LEL

Barometric Pressure was 28.50 inches of water and steady on 6/22/2010.

Table 2. Landfill Gas Monitoring Data, Cheyne Landfill

2010 Q2

Probe	Date	Time	CH4 (% total)	CO2 (% total)	O2 (% total)
GP-1S	6/3/2010	10:10:00 AM	0.1	2.6	17.6
GP-1D	6/3/2010	10:05:00 AM	0.5	6.2	11.1
GP-2S	6/3/2010	9:54:00 AM	0	2.5	18.1
GP-2D	6/3/2010	9:52:00 AM	**9**	4.4	0
GP-3S	6/3/2010	9:43:00 AM	2.8	19.7	5.2
GP-3D	6/3/2010	9:40:00 AM	**20.8**	29.5	1.3
GP-4S	6/3/2010	3:40:00 PM	0	0.1	20
GP-4D	6/3/2010	3:38:00 PM	0	0.1	20.1
GP-5S	6/3/2010	3:49:00 PM	0	0	20.3
GP-5D	6/3/2010	3:50:00 PM	0	0	20.3
GP-6-1	6/11/2010	9:26:00 AM	0	0	20.4
GP-6-2	6/11/2010	9:26:00 AM	0	0	20.5
GP-7-1	6/11/2010	9:45:00 AM	0	0	20.3
GP-7-2	6/11/2010	9:45:00 AM	0	0	20.4
GP-8-1	6/3/2010	4:00:00 PM	0.8	14.4	10.4
GP-8-2	6/3/2010	4:00:00 PM	0.5	12.1	12.3

Bold indicates value above LEL

Barometric Pressure was 28.54 and stable on 6/3/2010.

Table 3. Landfill Gas Monitoring Data, Lower Valley Transfer Station

2010 Q2

Probe	Date	Time	CH4 (% total)	CO2 (% total)	O2 (% total)
GP-1S	6/2/2010	5:58:00 PM		8.1	12.1
GP-1D	6/2/2010	6:00:00 PM	0.1	13.8	8.2
GP-2S	6/2/2010	6:27:00 PM	0.1	0.1	20
GP-2D	6/2/2010	6:25:00 PM	0	0.1	20
GP-3S	6/2/2010	6:12:00 PM	0	6.6	12.4
GP-3D	6/2/2010	6:14:00 PM	0.1	10.7	7.9
Flare	6/2/2010	6:04:00 PM	0.5	11.1	8.2
GW-1	6/2/2010	5:41:00 PM	1.4	21	0.1
GW-2	6/2/2010	5:38:00 PM	**10.2**	23.5	0
GW-3	6/2/2010	5:35:00 PM	**18**	26.7	0
GW-4	6/2/2010	5:31:00 PM	**28.6**	26.4	0
GW-5	6/2/2010	5:28:00 PM	**18.9**	24.6	0
GW-6	6/2/2010	5:44:00 PM	1.1	20.3	0
GW-7	6/2/2010	5:25:00 PM	**41.2**	32.1	0
GW-8	6/2/2010	5:20:00 PM	**42.5**	32.2	0
GW-9	6/2/2010	5:24:00 PM	**35.4**	30.2	0
GW-10	6/2/2010	5:17:00 PM	**50.2**	35.8	0.1

Bold indicates value above LEL

Barometric Pressure was 28.70 and steady on 6/2/2010.

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⊕ GW Monitoring Well

☆ Gas Extraction Well

▲ Gas Probe

⊡ Landfill Production Well

● Test Boring

Public Works Parcels

Parcels

N

0 Feet 600

LiDAR from Puget Sound LiDAR Consortium (PSLC), 2003
Ortho from NRCS, 2006

Figure 1

Terrace Heights Landfill Site Map

PgG

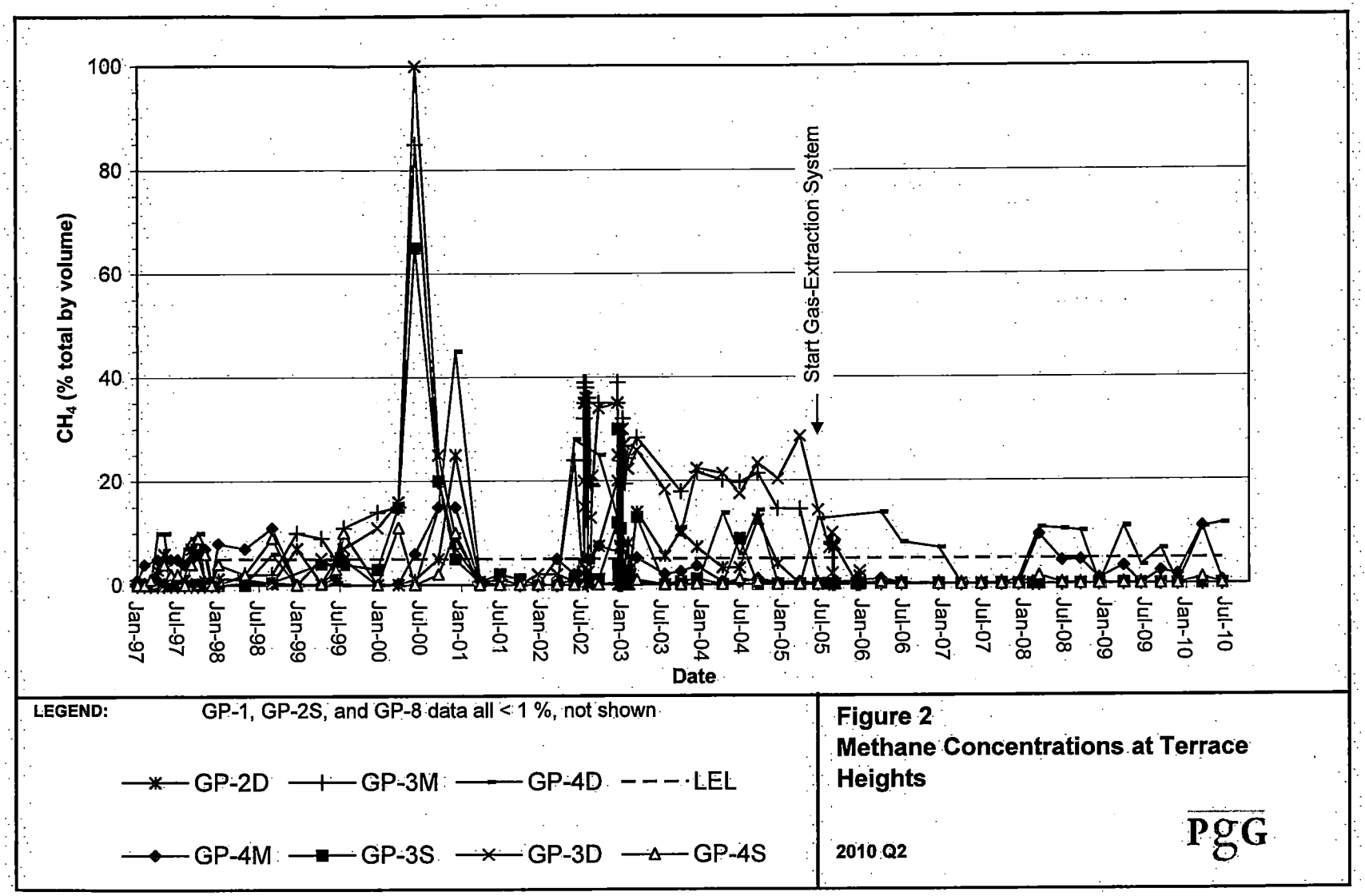

Figure 2
Methane Concentrations at Terrace Heights

2010 Q2

PgG

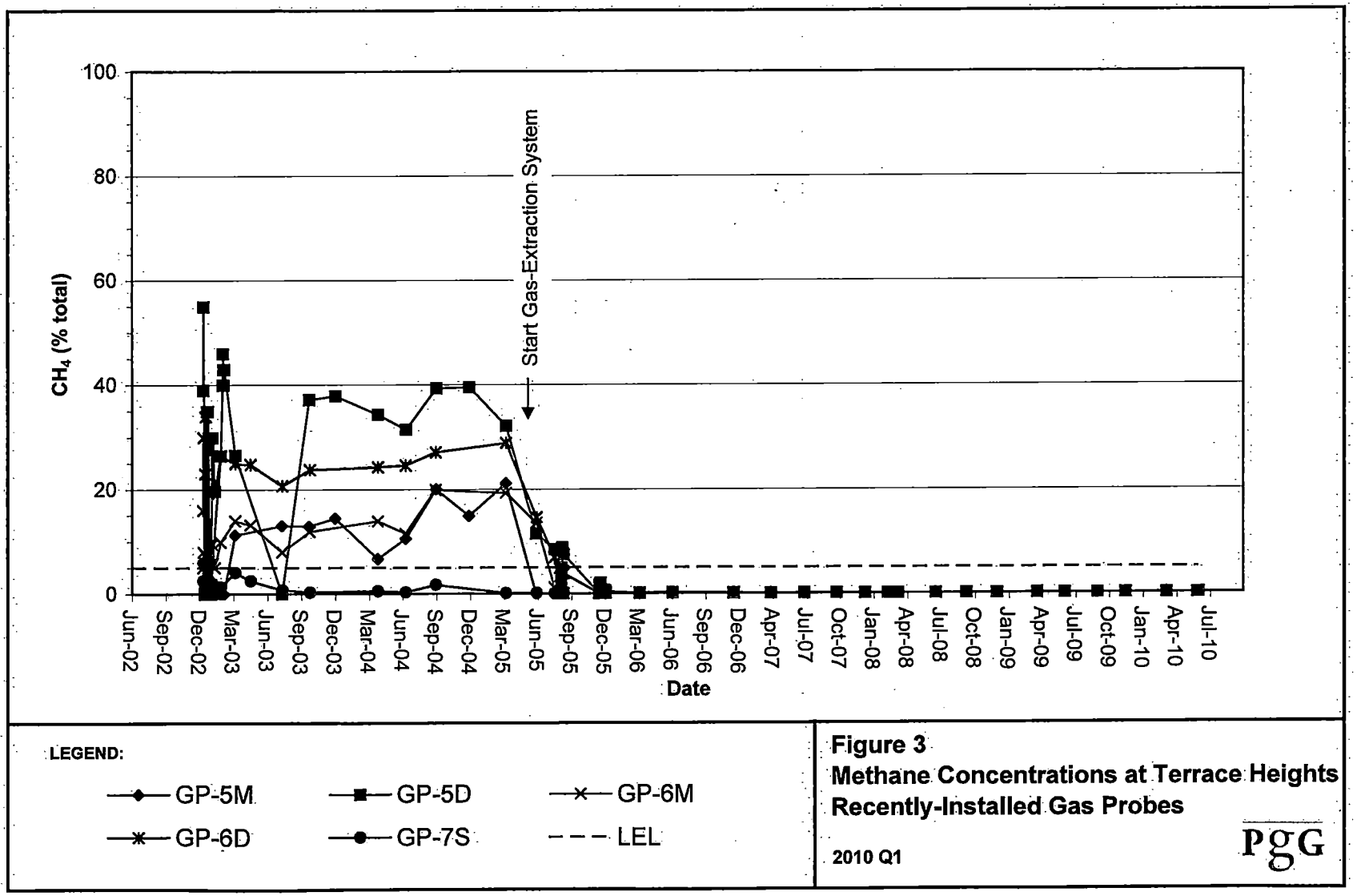

Figure 3
Methane Concentrations at Terrace Heights
Recently-Installed Gas Probes

2010 Q1

PgG

Figure 4
Cheyne Site Map

PgG

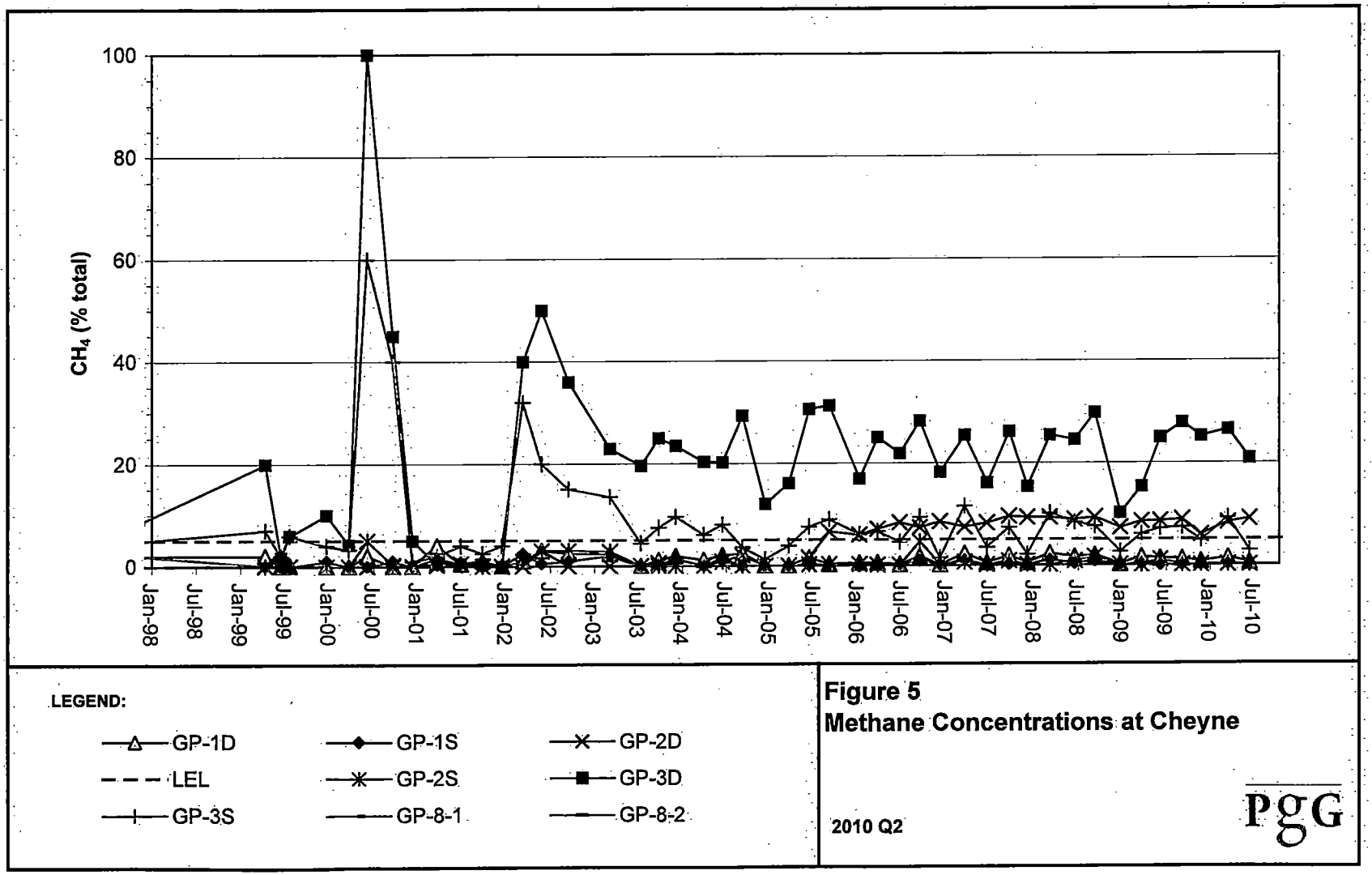

Figure 5
Methane Concentrations at Cheyne

2010 Q2

PgG

⊕ Monitoring Well

⊡ Gas Well

▲ Gas Probes

——— Gas Extraction Piping

——— Parcels (approximate)

N

0 Feet 400

1 inch equals 400 feet
2006 Orthophoto

Figure 6

Lower Valley Transfer Station
Site Map